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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of: Mieher, et al.

Attorney Docket No.:  
KLA1P117X1A/P1151/2

Application No.: 10/785,396

Examiner: STOCK JR, GORDON J

Filed: February 23, 2004

Group: 2877

Title: APPARATUS AND METHODS FOR  
DETECTING OVERLAY ERRORS USING  
SCATTEROMETRY

**CERTIFICATE OF MAILING**

I hereby certify that this correspondence is being deposited with the U.S. Postal Service with sufficient postage as first-class mail on May 13, 2005 in an envelope addressed to the Commissioner for Patents, P.O. Box 1450 Alexandria, VA 22313-1450.

Signed: \_\_\_\_\_

Natalie Morgan

**INFORMATION DISCLOSURE STATEMENT  
37 CFR §§1.56 AND 1.97(b)**

Mail Stop Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

The references listed in the attached PTO Form 1449, copies of which are attached, may be material to examination of the above-identified patent application. Applicants submit these references in compliance with their duty of disclosure pursuant to 37 CFR §§1.56 and 1.97. The Examiner is requested to make these references of official record in this application.

This Information Disclosure Statement is not to be construed as a representation that a search has been made, that additional information material to the examination of this application does not exist, or that these references indeed constitute prior art.

This Information Disclosure Statement is: (i) filed within three (3) months of the filing date of the above-referenced application, (ii) believed to be filed before the mailing date of a first Office Action on the merits, or (iii) believed to be filed before the mailing of a first Office Action after the filing of a Request for Continued Examination under §1.114. Accordingly, it is believed that no fees are due in connection with the filing of this Information Disclosure Statement. However, if it is determined that any fees are due, the Commissioner is hereby authorized to charge such fees to Deposit Account 500388 (Order No. KLA1P117X1A).

Respectfully submitted,

BEYER WEAVER & THOMAS, LLP

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**Form 1449 (Modified)**

**Information Disclosure  
Statement By Applicant**

(Use Several Sheets if Necessary)

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**U.S. Patent Documents and Publications**

Examiner Initial	No.	Patent No.	Date	Patentee	Class	Sub- class	Filing Date
	A1	6,079,256	06/27/00	Bareket	73	105	12/07/98
	A2	5,608,526	03/04/97	Pinwonka-Corle et al.	356	369	01/19/95
	A3	5,596,406	01/21/97	Rosencwaig et al.	356	327	08/15/95
	A4	6,462,818	10/08/02	Bareket	356	401	06/22/00
	A5	5,166,752	11/24/92	Spanier et al.	356	369	01/11/90
	A6	4,999,014	03/12/91	Gold et al.	356	382	05/04/89
	A7	6,590,656	07/08/03	Xu et al.	356	369	09/21/01
	A8	6,611,330	08/26/03	Lee et al.	356	369	02/06/01
	A9	6,023,338	02/08/00	Bareket	356	401	07/12/96
	A10	4,820,055	04/11/89	Muller	356	401	08/25/86
	A11	6,013,355	01/11/00	Chen et al.	428	209	12/30/96
	A12	5,343,292	08/30/94	Brueck et al.	356	363	10/19/90
	A13	6,160,622	12/12/00	Dirksen et al.	356	401	06/18/98
	A14	6,323,560	11/27/01	Narimatsu et al.	257	798	01/27/00
	A15	4,631,416	12/23/86	Trutna, Jr.	250	548	12/19/83
	A16	4,828,392	05/09/89	Nomura et al.	356	401	03/10/86
	A17	5,465,148	11/07/95	Matsumoto et al.	356	349	10/21/93
	A18	4,848,911	07/18/89	Uchida et al.	356	356	06/11/87
	A19	6,197,679	03/06/01	Hattori	438	636	03/23/99
	A20	5,172,190	12/15/92	Kaiser	356	401	01/11/91
	A21	5,923,041	07/13/99	Cresswell et al.	250	491.1	04/25/95
	A22	4,167,337	09/11/79	Jaerisch et al.	356	354	06/13/77
	A23	6,420,791	07/16/02	Huang et al.	257	797	11/23/99
	A24	6,342,735	01/29/02	Colelli et al.	257	797	09/01/99
	A25	5,525,840	06/11/96	Tominaga	257	797	11/09/94
	A26	5,909,333	06/01/99	Best et al.	360	51	06/18/97
Examiner				Date Considered			

Examiner: Initial citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<b>Form 1449 (Modified)</b>  <b>Information Disclosure Statement By Applicant</b>  (Use Several Sheets if Necessary)	Atty Docket No.	Application No.:
	KLA1P117X1A/P1151/2	10/785,396
	Applicant:	
	Mieher, et al.	
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### U.S. Patent Documents and Publications

Examiner Initial	No.	Patent No.	Date	Patentee	Class	Sub-class	Filing Date
	B1	5,912,983	06/15/99	Hiratsuka	382	144	07/25/97
	B2	6,165,656	12/26/00	Tomimatu	430	22	04/20/99
	B3	6,522,406	02/18/03	Rovira et al.	356	369	06/07/01
	B4	5,883,710	07/10/95	Nikoonahad et al.	356	237.2	06/10/95
	B5	6,081,325	06/27/00	Leslie et al.	356	237.2	06/03/97
	B6	4,818,110	04/04/89	Davidson	356	358	05/06/86
	B7	5,112,129	05/12/92	Davidson et al.	356	359	03/02/90
	B8	5,889,593	02/30/99	Bareket	356	445	02/26/97
	B9	6,486,954	11/26/02	Mieher et al.	356	401	09/01/00
	B10	6,633,831	10/14/03	Nikoonahad et al.	702	155	09/20/01
	B11	6,420,971	07/16/02	Leck et al.	340	542	06/22/00
	B12	6,342,735	01/29/02	Colelli et al.	257	797	09/01/99
	B13	5,909,333	06/01/99	Best et al.	360	51	06/18/97
	B14	6,323,560	11/27/01	Narimatsu et al.	257	798	01/27/00
	B15	6,013,355	01/11/00	Chen et al.	428	209	12/30/96
	B16	4,703,434	10/27/87	Brunner	364	488	04/24/84
	B17	5,783,342	07/21/98	Yamashita et al.	430	30	12/27/95
	B18	5,801,390	09/01/98	Shiraishi	250	559.3	02/07/97
	B19	6,421,124	07/16/02	Matsumoto et al.	356	401	12/02/98
	B20	5,182,455	01/26/93	Muraki	250	548	05/11/92
	B21	6,476,920	11/05/02	Scheiner et al.	356	630	06/26/00
	B22	5,189,494	02/23/93	Muraki	356	401	01/08/92
	B23	5,316,984	05/31/94	Leourx	437	250	03/25/93
	B24	5,327,221	07/05/94	Saitoh et al.	356	355	07/29/92
	B25	5,666,196	09/09/97	Ishii et al.	356	356	11/17/95
	B26	6,046,094	04/04/00	Jost et al.	438	400	07/29/98
Examiner				Date Considered			

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**U.S. Patent Documents and Publications**

Examiner Initial	No.	Patent No.	Date	Patentee	Class	Sub- class	Filing Date
	C1	5,182,610	01/26/93	Shibata	356	349	04/19/91
	C2	6,153,886	11/28/00	Hagiwara et al.	250	548	09/28/99
	C3	6,462,818	10/08/02	Bareket	356	401	06/22/00
	C4	5,114,235	05/19/92	Suda et.	356	401	07/17/90
	C5	5,414,514	05/09/95	Smith et al.	356	363	06/01/93
	C6	4,103,998	08/01/78	Nakazawa et al.	356	152	07/19/76
	C7	5,340,992	08/23/94	Matsugu et al.	250	548	11/18/92
	C8	6,077,756	06/20/00	Lin et al.	438	401	04/24/98
	C9	6,128,089	10/03/00	Ausschnitt et al.	356	401	06/28/98
	C10	6,177,330	01/23/01	Yasuda	438	401	03/26/98
	C11	6,255,189	07/03/01	Muller et al.	438	401	10/19/99
	C12	4,200,395	04/29/80	Smith et al.	356	356	05/03/77
	C13	4,332,473	06/01/82	Ono	356	356	11/22/80
	C14	4,750,836	06/14/88	Stein	356	399	09/18/86
	C15	5,596,413	01/21/97	Stanton et al.	356	401	08/17/95
	C16	4,929,083	05/29/90	Brunner	356	400	03/20/89
	C17	2003/0020184	01/30/03	Ballarin	257	797	05/21/02
	C18	2002/0149782	10/17/02	Raymond	356	616	02/28/02
	C19	2002/0072001	06/13/02	Brown et al.	430	30	05/04/01
	C20	2002/0135875	09/26/02	Niu et al.	359	564	02/27/01
	C21	2002/0158193	10/31/02	Sezginer et al.	250	237	02/12/02
	C22	2002/0192577	12/19/02	Fay et al.	430	22	06/15/01
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**Foreign Patent or Published Foreign Patent Application**

Examiner Initial	No.	Document No.	Publication Date	Country or Patent Office	Class	Sub- class	Translation	
							Yes	No
	D1	WO/9956174	04.11.99	WIPO	G03B	27/42	X	
	D2	11-86332	3.30.99	JAPAN	G11B	7/135		X
	D3	JP 60-126881	86.07.06	JAPAN	H01S	3/18		X
	D4	JP 63-248804	10.17.88	JAPAN	C08F	10/00		X
	D5	WO/85/04266	26.09.85	WIPO	G03B	41/00	X	
	D6	WO/95/02200	19.01.95	WIPO	G02B	5/18	X	
	D7	WO03042629	22.05.03	WIPO	G01B	11/00	X	
	D8	WO/03054475	03.07.03	WIPO	G01B	11/06	X	
	D9	WO/0218871	07.03.02	WIPO	G01B	11/27	X	
	D10	WO 02/065545	22.08.02	WIPO	H01L	21/66	X	
	D11	WO/0215238	21.02.02	WIPO	H01L	21/00	X	
	D12	WO 01/97279	20.12.01	WIPO	H01L	21/66	X	
	D13	WO 02/35300	02.05.02	WIPO	G05B	19/00	X	
	D14	WO 02/25723	28.03.02	WIPO	H01L	21/66	X	
	D15	WO 99/45340	10.09.99	WIPO	G01B	11/02	X	
	D16	WO 0250509	27.06.02	WIPO	G01N		X	
	D17	WO 03/001297	03.01.03	WIPO	G03F	G03F	X	
	D18	WO 02/084213	24.10.02	WIPO	G01B	11/00	X	
	D19	WO02/25708	28.03.02	WIPO	H01L	21/00	X	
	D20	WO01/84382	08.11.01	WIPO	G06F	17/50	X	
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**Other Documents**

Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
	F1	TDB, "Phase-Sensitive Overlay Analysis Spectrometry," IBM Technical Disclosure Bulletin, March 1990. pp 170-174 <a href="http://www.delphion.com">www.delphion.com</a>
	F2	TDB, "Interferometric Method of Checking the Overlay Accuracy in Photolitho Graphic Exposure Processes." IBM Technical Disclosure Bulletin, March 1990. pp 214-217. <a href="http://www.delphion.com">www.delphion.com</a>
	F3	TDB, "Mask Overlay Determination" IBM Technical Disclosure Bulletin, December 1978, pp 272-2773. <a href="http://www.delphion.com">www.delphion.com</a>
	F4	TDB, "Interferometric Measurement System for Overlay Measurement in Lithographic Processes", February 1994, pp535-536
	F5	Sang-Man Bae, et al., "Performance of New Overlay Measurement Mark," 424/SPIE Vol. 2725
	F6	V.I. Arkipov, "Kinetics of the Diffraction Efficiency of Light-Induced Dynamic Gratings in Layers of Disordered Semiconductors", Moscow Engineering-Physics Institute Submitted February 14, 1992; Quantum Electron November 1993. 1994 American Institute of Physics
	F7	Joseph C. Pellegrini, et al., "Super Sparse Overlay Sampling Plans: An Evaluation of Methods and Algorithms for Optimizing Overlay Quality Control and Metrology Tool Throughput", SPIE Vol. 3677-0277-786X
	F8	V.C. Jaiprakash and C. J. Gould, "Comparison Optical, SEM, and AFM Overlay Measurement, SPIE Vol. 3677-0277-786X
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**Other Documents**

Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
	G1	Ya V. Fattakhov, "Formation of Periodic Diffraction Structures at Semiconductor Surfaces for Studying the Dynamics of Photoinduced Phase Transitions", 0030-400X/00/8901-0136
	G2	D.G. Papazoglou, et al., "Photorefractive Optical Properties of Volume Phase Gratings Induced in Sillenite Crystals, When the Grating Vector Lies on the 111 plane, "Appl. Phys. B 71, 841-848 (2000)
	G3	Kenneth W. Tobin, et al. "Automatic Classification of Spatial Signatures on Semiconductor Wafermaps," SEMATECH, Austin, Texas. SPIE Vol. 3050
	G4	Bharath Rangarajan, et al., "Optimal Sampling Strategies for sub-100 nm Overlay, APD Lithography, Advanced Micro Devices Inc., Sunnyvale, CA, Department of Chemical Engineering, Michigan State University, East Lansing, MI, SPIE Vol. 3332
	G5	R.C. Herbert, "Width and Overlay Narrow Kerf Test Site", IBM TDB, 04/1978, Vol. 20 No. 11A. IBM Corp.
	G6	Young-Chang Kim, et al. "Automatic In-Situ Focus Monitor Using Line Shortening Effect", Journal: Proceedings of the SPIE, vol. 3677, pt.1-2, p. 184-93
	G7	Enrique R. Sherman, "Characterization and Monitoring of Variable NA and Variable Coherence Capable Photo Steppers Utilizing the Phase Shift Focus Monitor Reticle," Journal: Proceedings of the SPIE, vol. 2439, p. 61-9.
		Date Considered

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#### Other Documents

Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
	H1	Jorg Bischoff, et al. "Modeling of Optical Scatterometry with Finite-Number-of-Periods Grating", Journal: Proceedings of the SPIE, vol. 3743, p. 41-8.
	H2	T. Baumbach, et al. "Grazing Incidence Diffraction by Laterally Patterned Semiconductor Nanostructures", Journal: Journal of Physics, vol. 32, no. 6, p. 726-40.
	H3	Norio Uchida, et al. "A Mask-to-Wafer* Alignment and Gap Setting Method for X-Ray Lithography Using Gratings", Journal: Journal of Vacuum Science & Technology B, vol. 9, no. 6, p. 3202-6.
	H4	Hideki INA, et al. "Alignment Mark Optimization to Reduce Tool and Wafer-induced Shift for XTRA-1000", Japanese Journal of Applied Physics, vol. 38, no. 12B, p. 7065-70
	H5	Auzino, L., "A New Technique for Multiple Overlay Check", Abstract. First Search: Detailed Record, Terms & Conditions 1992-2003. Copyright, 1998, IEE.
	H6	H.J. Levinson, et al., "Minimization of Total Overlay Errors on Product Wafers Using an Advanced Optimization Scheme" Abstract. First Search: Detailed Record. Terms & Conditions 1992-2003. Copyright 1998, IEEE.
	H7	K. Kodate, et al. "Towards the Optimal Design of Binary Optical Elements with Different Phase Levels Using a Method of Phase Mismatch Correction," Abstract. First Search: Detailed Record. Copyright 2001, IEE.
	H8	Klienkecht, H.P., "Diffraction and Interference Optics for Monitoring Fine Dimensions in Device Manufacture", Copyright 1984 The Institute of Physics. Inst. Phys. Conf. Ser. No. 69. Paper presented at ESSDERC/SSSDT 1983, Canterbury 13-16 Sept. 1983.
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